ARISCC

Adapting Rail Infrastructure to Climate Change
Adapting Rail Infrastructure to Climate Change

Risks from impacts by climate and natural hazards are already handled by the railways.

Danger processes for railway infrastructure

Interpraevent | 2010 | Taiwan

Christian Rachoy
## ARISCC – Scope

<table>
<thead>
<tr>
<th>Factor</th>
<th>Effect</th>
<th>Impact on Railways/Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td></td>
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<tr>
<td>High temperatures and heat waves</td>
<td>overheating</td>
<td>infrastructure &amp; rolling stock equipment</td>
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<tr>
<td>Sudden temperature changes</td>
<td>tension</td>
<td>track buckling</td>
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<tr>
<td>Intense sunlight</td>
<td>overheating</td>
<td>track buckling, slope fires, signaling problems</td>
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<tr>
<td>Precipitation</td>
<td></td>
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<tr>
<td>Intense rainfall</td>
<td>soil erosion, land sides, flooding</td>
<td>damage to embankments, earthwork</td>
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<tr>
<td>Extended rain periods</td>
<td>slower drainage, soil erosion</td>
<td>other infrastructure assets, operation</td>
</tr>
<tr>
<td>Flooding: coastal, surface water, fluvial</td>
<td>landslides</td>
<td>drainage systems, tunnels, bridges</td>
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<tr>
<td>Drought</td>
<td>desiccation</td>
<td>earthworks desiccation</td>
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<tr>
<td>Wind</td>
<td></td>
<td></td>
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<tr>
<td>Storm/gale (inland)</td>
<td>higher wind forces</td>
<td>damage to installations, catenary</td>
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<td>uprooting of trees</td>
<td>restrictions/disruption of train operation</td>
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<tr>
<td>Coastal storms &amp; sea level raise</td>
<td>Coastal flooding</td>
<td>embankments, earthwork, operation</td>
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<tr>
<td>Lightning strikes &amp; thunderstorms</td>
<td>Overvoltage</td>
<td>catenary and signaling</td>
</tr>
<tr>
<td>Vegetation</td>
<td>Faster plant growth, new plants</td>
<td>vegetation management</td>
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</tbody>
</table>
The Focus of ARISCC

Climate Change will increase the risks because events will happen more often, with higher intensity, or new impacts will occur in one region, which are met already in other regions.

We have to
- Identify risks/ vulnerabilities,
- Manage quantitative risk assessments,
- Classify and prioritise risks
- Learn from best practice

The informations are needed by
- Governments for longterm planning and financing infrastructure projects,
- Infrastructure managers for planning and managing the risks,
- Companies within the risk assurance and construction business.
Deliverables of ARISCC

D1 **Solutions and Examples for Natural Hazard Management & Early Warning Systems** (monitoring, impact assessment, vulnerability mapping, early warning, risk assessment)

D2 **Knowledge Base & Exchange Platform** (good practice, pilot projects, competence mapping, country profiles, contacts…)

D3 **Case Studies: UK West Coast, Rhine Valley, Global Case Study** (mapping, risk & costs assessment, cost scenarios 2030 with/without adaptation)

D4 **Guidance Document: Risk Analysis & Adaptation Measures** (guidance for integrated natural hazard management, easy to use document, example for concrete line)

D5 **Standards for new and existing Infrastructure** (integration of climate change into standards, different procedures in Europe)
Integrated Natural Hazard Management & Adaptation to Climate Change - Elements of Guideline

Collecting informations
- Weather Information & Weather Warning
- Regional Climate Projections & expected Climate Loads
- Event Recording, Documentation & Assessment
- Monitoring & Documentation of Status of Assets

Allocating Risks
- Vulnerability Mapping
- Natural Hazard Mapping

Taking Measures
- Risk Assessment & Risk Management
  - Alternative Adaptation Scenarios (costs & impacts)

Implementation of Adaptation Aspects in all Steps
Intermediate Results

- Solutions for Integrated Natural Hazard Management (detailed)
- Collection of good practice projects and measures (30 examples)
- Competence mapping for adaptation of railway infrastructure to climate change
- Swedish Guidance document on risk analysis – methodology paper
- Structure of guidance document (Integrated natural hazard management)
- Increased number of actively contributing partners
- Coordination with relevant adaptation to climate change projects (TraCCa, Chamäleon, PARAmount)
The Winter Season 2009/2010

What happened?

- Heavy snowfalls
- Temperatures between -5°C - +5°C
- Long winter season

What failed?

- Rolling Stock (Frozen couplings and doors)
- Infrastructure (Frozen switches, crossings)
- Catenary
Overview
Problems with the Infrastructure

Source: First Evaluation of the UIC “Winter and Railways” Survey
The UIC Experience Platform
“Winter and Railways”

> Request the members of the UIC Rail System Form (RSF) Steering Committee

Work Plan

> Questionnaire „Winter and Railways“ sent to all UIC RSF members
> Feedback received and evaluated
> First overview “Problems/ Challenges/ Experience” to be circulated before the summer break
> Workshop “Winter and Railways” (jointly TOC, IM and the industry) in September 2010
> Report “Experience & Recommendations” in October 2010